WHAT IS CLAIMED IS:

1. A method for obtaining an estimate of a noise-free portion of a noise-containing digital signal, comprising the steps of:

(a) applying a set of M linear transforms to the noise-containing digital signal;

(b) determining M initial de-noised estimates of each digital element of the digital signal;

(c) deriving a combination of weight factors for the M initial de-noised estimates of each digital element by formulating the combination as a linear estimation problem and solving it for the individual weight factors; and

(d) formulating a final de-noised estimate of each digital element based on the corresponding M initial de-noised estimates and the combination of weight factors determined in steps (b) and (c) respectively.

2. The method of claim 1, wherein the set of M linear transforms is applied to the digital signal as a whole or to each digital element.

3. The method of claim 1, wherein, for each linear transform in the set of M linear transforms, the M initial de-noised estimates of a particular digital element are obtained by thresholding each transform coefficient that has an absolute value below a threshold and inverse transforming the non-thresholded transform coefficients.

4. The method of claim 1, wherein the combination of weight factors is an optimal combination.

5. The method of claim 1, wherein the combination of weight factors is derived such that a conditional mean squared error with respect to the initial de-noised estimates is minimized.

6. The method of claim 1, wherein the set of M linear transforms comprises (i) a discrete cosine transform and a predetermined number of its overcomplete shifts, (ii) a wavelet transform and a predetermined number of its overcomplete shifts, or (iii) a Fourier transform and a predetermined number of its overcomplete shifts.

7. The method of claim 1, wherein the digital signal is an image or video frame comprised of a plurality of pixels, wherein each digital element comprises one or a group of pixels.

8. A method for obtaining an estimate $\hat{x}$ of a noise-free portion x of a noise-containing signal y, comprising the steps of:

obtaining an estimate $\hat{x}(n)$ for each element n of $\hat{x}$ according to the following equation:

$$\hat{x}(n) = \sum_{i=1}^{M} \alpha_i(n)\hat{x}_i(n), n = 1,\ldots, N ,$$

wherein weight factors $\alpha_i(n), i = 1,\ldots, M, n = 1,\ldots, N$ are optimally determined by formulating a combination thereof as a linear estimation problem; and

combining the N $\hat{x}(n)$ estimates to obtain $\hat{x}$.

9. The method of claim 8, wherein $\alpha_i(n)$ are optimally determined such that $\hat{x}(n)$ minimizes a conditional mean squared error with respect to the initial de-noised estimates.

10. The method of claim 9, wherein $\alpha_i(n)$ are optimally determined based on a scaling factor that removes explicit dependence to noise variance and on a matrix that is dependent on an overcomplete transform set applied in obtaining each $\hat{x}(n)$.

11. The method of claim 9, wherein $\alpha_i(n)$ are optimally determined based on a scaling factor that removes explicit dependence to noise variance and on a diagonal

matrix that is derived from a matrix that is dependent on an overcomplete transform set applied in obtaining each $\hat{x}(n)$.

12. The method of claim 9, $\alpha_i(n)$ are optimally determined based on a scaling factor that removes explicit dependence to noise variance and on a reduced diagonal matrix that is derived from a diagonal matrix that is, in turn, derived from a matrix that is dependent on an overcomplete transform set applied in obtaining each $\hat{x}(n)$.

13. An apparatus for obtaining an estimate of a noise-free portion of a noise-containing digital signal, the apparatus comprising:

one or more components configured to:

apply a set of M linear transforms to the noise-containing digital signal;

determine M initial de-noised estimates of each digital element of the digital signal;

derive a combination of weight factors for the M initial de-noised estimates of each digital element by formulating the combination as a linear estimation problem and solving it for the individual weight factors; and

formulate a final de-noised estimate of each digital element based on the corresponding M initial de-noised estimates and the combination of weight factors determined in steps (b) and (c) respectively.

14. The apparatus of claim 13, wherein the set of M linear transforms is applied to the digital signal as a whole or to each digital element.

15. The apparatus of claim 13, wherein, for each linear transform in the set of M linear transforms, the M initial de-noised estimates of a particular digital element are obtained by thresholding each transform coefficient that has an absolute value below a threshold and inverse transforming the non-thresholded transform coefficients.

16. The apparatus of claim 13, wherein the combination of weight factors is an optimal combination.

17. The apparatus of claim 13, wherein the combination of weight factors is derived such that a conditional mean squared error with respect to the initial de-noised estimates is minimized.

18. The apparatus of claim 13, wherein the set of M linear transforms comprises (i) a discrete cosine transform and a predetermined number of its overcomplete shifts, (ii) a wavelet transform and a predetermined number of its overcomplete shifts, or (iii) a Fourier transform and a predetermined number of its overcomplete shifts.

19. The apparatus of claim 13, wherein the digital signal is an image or video frame comprised of a plurality of pixels, wherein each digital element comprises one or a group of pixels.

20. A device-readable medium having a program of instructions for directing a machine to perform a process of obtaining an estimate of a noise-free portion of a noise-containing digital signal, the program comprising:

(a) instructions for applying a set of M linear transforms to the noise-containing digital signal;

(b) instructions for determining M initial de-noised estimates of each digital element of the digital signal;

(c) instructions for deriving a combination of weight factors for the M initial de-noised estimates of each digital element by formulating the combination as a linear estimation problem and solving it for the individual weight factors; and

(d) instructions for formulating a final de-noised estimate of each digital element based on the corresponding M initial de-noised estimates and the combination of weight factors determined in steps (b) and (c) respectively.

21. The device-readable medium of claim 20, wherein instruction (a) comprises instructions for applying the set of M linear transforms to the digital signal as a whole or to each digital element.

22. The device-readable medium of claim 20, wherein instruction (b) comprise instructions for obtaining the M initial de-noised estimates of each digital element by thresholding each transform coefficient, of each linear transform in the set of M linear transforms, that has an absolute value below a threshold and inverse transforming the non-thresholded transform coefficients.

23. The device-readable medium of claim 20, wherein, in instruction (c), the combination of weight factors is an optimal combination.

24. The device-readable medium of claim 20, wherein, in instruction (c), the combination of weight factors is derived such that a conditional mean squared error with respect to the initial de-noised estimates is minimized.

25. The device-readable medium of claim 20, wherein, in instruction (a), the set of M linear transforms comprises (i) a discrete cosine transform and a predetermined number of its overcomplete shifts, (ii) a wavelet transform and a predetermined number of its overcomplete shifts, or (iii) a Fourier transform and a predetermined number of its overcomplete shifts.

26. The device-readable medium of claim 20, wherein the digital signal is an image or video frame comprised of a plurality of pixels, wherein each digital element comprises one or a group of pixels.

27. A device-readable medium having a program of instructions for directing a machine to perform a process of obtaining an estimate $\hat{x}$ of a noise-free portion x of a noise-containing signal y, the program comprising:

instructions for obtaining an estimate $\hat{x}(n)$ for each element n of $\hat{x}$ according to the following equation:

$$\hat{x}(n) = \sum_{i=1}^{M} \alpha_i(n)\hat{x}_i(n), n = 1,\ldots,N ,$$

wherein weight factors $\alpha_i(n), i = 1,\ldots,M, n = 1,\ldots,N$ are optimally determined by formulating a combination thereof as a linear estimation problem; and

instructions for combining the N $\hat{x}(n)$ estimates to obtain $\hat{x}$.

28. The device-readable medium of claim 27, wherein $\alpha_i(n)$ are optimally determined such that $\hat{x}(n)$ minimizes a conditional mean squared error with respect to the initial de-noised estimates.

29. The device-readable medium of claim 28, wherein $\alpha_i(n)$ are optimally determined based on a scaling factor that removes explicit dependence to noise variance and on a matrix that is dependent on an overcomplete transform set applied in obtaining each $\hat{x}(n)$.

30. The device-readable medium of claim 28, wherein $\alpha_i(n)$ are optimally determined based on a scaling factor that removes explicit dependence to noise variance and on a diagonal matrix that is derived from a matrix that is dependent on an overcomplete transform set applied in obtaining each $\hat{x}(n)$.

31. The device-readable medium of claim 28, $\alpha_i(n)$ are optimally determined based on a scaling factor that removes explicit dependence to noise variance and on a reduced diagonal matrix that is derived from a diagonal matrix that is, in turn, derived from a matrix that is dependent on an overcomplete transform set applied in obtaining each $\hat{x}(n)$.